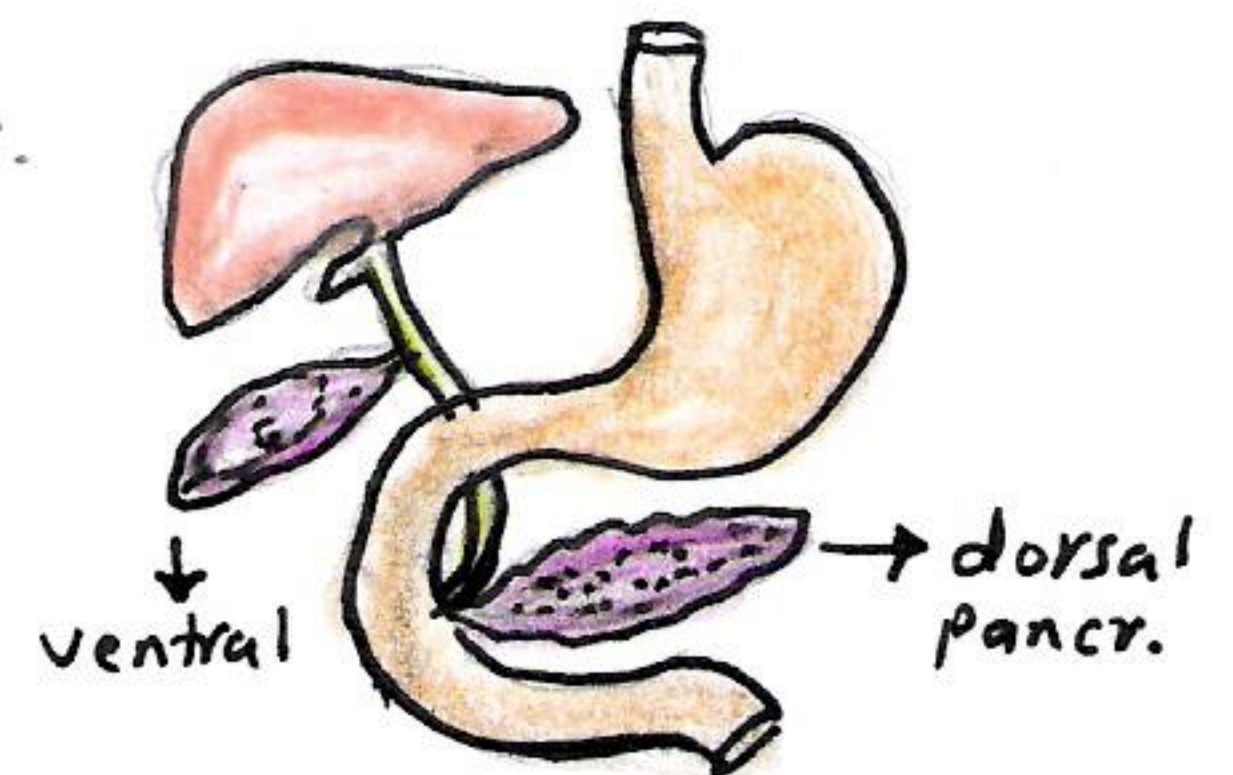


PANCREAS

* Embryology :-

- The pancreas develops from ^{endoderm at 4th wk.} 2 buds
 - 1- Ventral bud (hepatic diverticulum).
 - 2- Dorsal bud (duodenal diverticulum).



* Congenital anomalies :-

- ① Annular pancreas: → surrounding 2nd part of duodenum which → bile stained vomiting (if below ampulla).
- Plain x-ray → double bubble sign.
- ② Ectopic pancreas: → (in stomach, duodenum, Meckel's ^{diverticulum} ... etc)

* Physiology :-

- The pancreas is a mixed exocrine & endocrine organ.

* Exocrine funx :-

- Pancreatic acini secrete 1-2 litres of alkaline ^{HCO₃} enzyme-rich juice/day
- enzymes contain lipase, amylase, proteolytic enzymes (trypsinogen and chymotrypsinogen).
- CCK (cholecystokinin) secreted from duodenal mucosa → secreting an enzyme-rich secretion from pancreas.
- Secretin from duodenal mucosa → alkaline (HCO₃) rich secretion.
- secretion inhibited by sympathetic stimulation, somatostatin & glucagon
- secretion stimulated by parasymp. (vagus) stim., CCK & secretin.

* Endocrine funx :-

- Alpha cells → secrete Glucagon.
 - Beta cells → insulin.
 - Delta cells → somatostatin.
 - G-cells → Gastrin
- } these cells belong to APUD series.
- (G-cells not found normally in pancreas but in ZE syndrome)

VISIT...

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* Anatomy

* Description :-

- Pancreas is an elongated gland, lies at post. abdominal wall extending from duodenum to hilum of spleen, consist of:

- Head :: Lies in concavity of duodenum, having part behind superior mesenteric vessels called Uncinate Process.
 - related posteriorly to IVC & sup. mesenteric a (behind head)
 CBD inside head.
- Neck :: narrow portion between head & body,
 - Lies in front of formation of portal vein.
- Body :: triangular, crossing midline.
 - Lies in front of splenic vein (splenic artery runs above body)
- Tail :: - embedded in hilum of spleen inside lienorenal lig.

- Pancreas has 2 ducts.

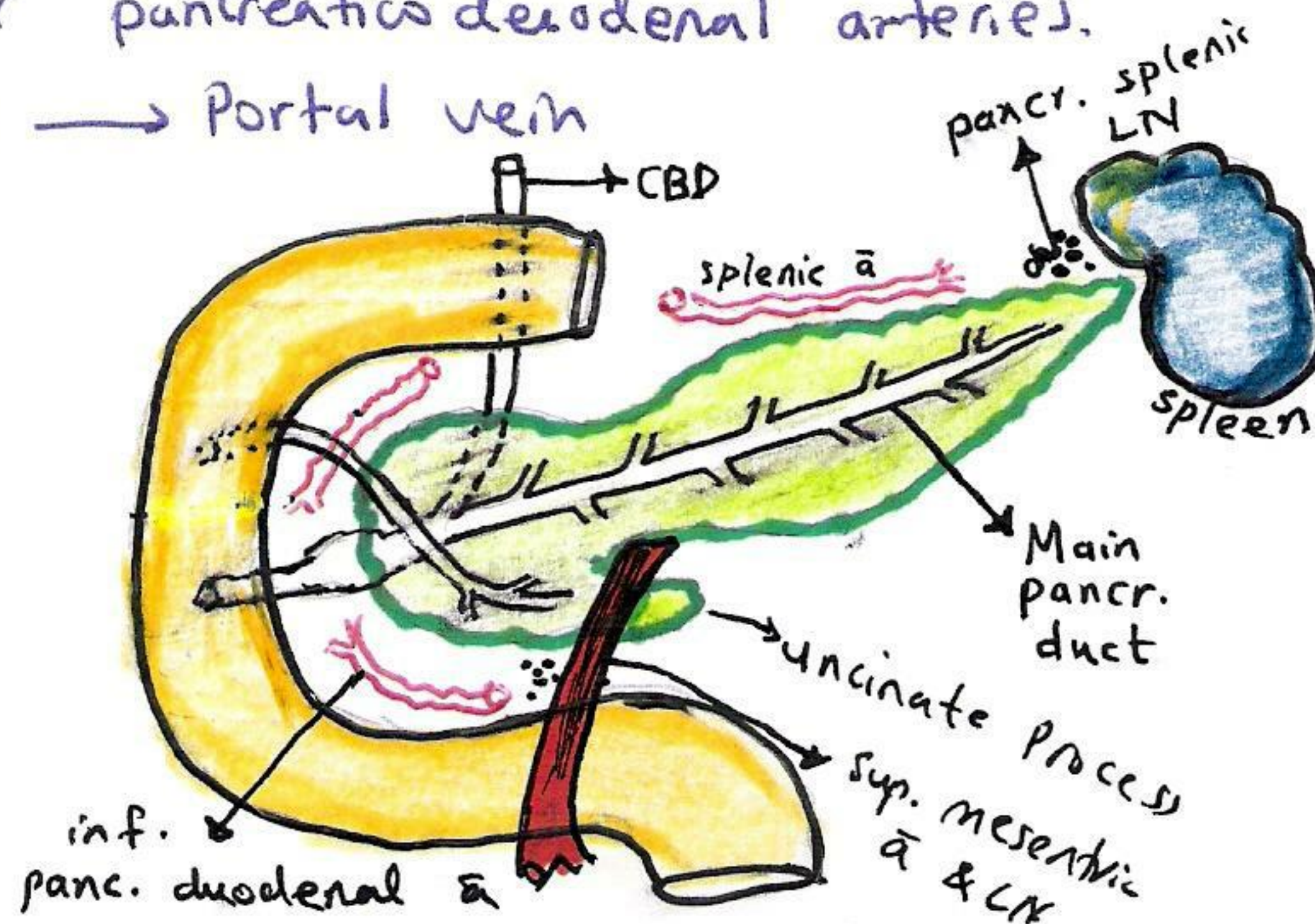
- ① Main Pancreatic duct (Duct of Wirsung): joining CBD to form ampulla of Vater, courses from tail to head.
- ② - Accessory panc. duct (Duct of Santorini): from uncinate process, opens into 2nd part of duodenum about inch above (proximal) to ampulla of Vater

* Blood supply :

- Arteries :: branches of splenic artery, superior pancreaticoduodenal and inferior pancreaticoduodenal arteries.
- Veins :: into corresponding veins → Portal vein

* Lymph Drain :-

- ① - Pancreatic Spleenic LN
- ② - superior mesenteric LN.
- ③ - pyloric LN.



PANCREATITIS

A ACUTE PANCREATITIS

- Acute inflammation of pancreas is one of the causes of acute abdominal pain, ^{3% Baily} it is a serious condition, death occurs in 10% of cases

* Aetiology :-

- ① Bile duct stones (50%) → impacted in ampulla of Vater.
- ② Alcohol intake (25%).
- ③ Others → ^{20%} idiopathic, ^{5%} traumatic (ERCP, operative, ... etc), mumps, hypercalcaemia (hyperparathyroidism) ^{MCQ}, hypothermia, drugs (steroids, OCP, etc), familial, autoimmune (SLE), scorpion bites, pancreatic carcinoma. ^{Thiazide diuretic}

* Pathology :-

- obstruction of pancreatic (Wirsung's) duct → bile regurgitate to pancreas → activate pancreatic enzymes (Trypsinogen) → autodigestion of pancreas.
- Fat necrosis of greater omentum & mesentery (by enz. lipase) → splits fat into Fatty acids & glycerol, $FA + Ca \rightarrow$ calcium soap → hypocalcaemia.
- blood stained exudate
- inflammation is ranges from
 - acute oedematous pancreatitis.
 - acute haemorrhagic "
 - acute necrotizing "

* Complications :-

- (A) General - hypovolemic shock, DIC
 - Paralytic ileus
 - Fluid & electrolyte dist.
 - Multiorgan Failure ^{ARDS} ^{ARF}
- (B) Local - pancreatic pseudocyst → see later
 - pancreatic abscess (5%) chronicity

hypovolemia due to loss of plasma ptn into peritoneal cavity & kinin → ↓ BP.
 ↳ ptn breakdown product

D/D

- Acute peptic ulcer.
- acute cholecystitis
- acute appendicitis
- Leaking AAA
- acute MI
- acute mesenteric vasular occlusion

* Clinical Picture :-

- Symptoms :- abdominal pain {severe} :- main symptom (in all cases)
radiate to back, preceded by heavy meal or alcohol
- Vomiting & retching are prominent features, hiccuph.
- H/O the cause
 - Signs :-
 - General → may show evidence of hypovolemic shock
 - Faint jaundice & cyanosis in 10% (panc. oedema)
 - pain relieved by leaning forward.
 - Local →
 - mild tender rigid upper abdomen.
 - Gray Turner sign: discoloration of Loin skin
 - Cullen's sign :- discoloration around umbilicus
 - s/s of complication
- bd exudate retro-peritoneal

* Investigations :-

- ① Serum amylase is elevated > 1000 IU/dL ($N = 100 - 300$ IU/dL) for 2-3 days
(not specific; ↑ in
 - Perforated peptic ulcer
 - Acute cholecystitis
 - Myocardial infarction
 - int. obstruction
 } never > 500 IU/dl
- ② Serum lipase is elevated (more specific than amylase).
- ③ ABG, WBC, U/E/C, LFT, --- etc. , ($\downarrow$ Ca, $\uparrow$ glucose, $\downarrow$ O₂), ECG, CPK (MI)
- ④ AXR (abdominal x-ray) • "sentinel loop": dilated segment of small intestine after 2nd day. adjacent to pancr. (local ileus)
 - Colon cut-off sign:- distended transverse colon & collapsed descending.
 - Absent psoas shadow.
 - CXR • pleural effusion in 20%.
- ⑤ USS (ultrasound) & CT scan → GBS & Pancreas details respectively
ERCP may needed.

* Prognosis :- churchill

Mortality rate overall is about 10% , with acute hemorrhagic pancreatitis $> 30\%$ & (even 50% in necrotizing one)

*Treatment: (A) Mainly conservative :-

- 1- Admission (if severe admit to ICU), resuscitation.
- 2- NPO (Nil Per mouth) to rest pancreas., NGT ^{wif ileus}
- 3- fluid replacement (I.V)
- 4- analgesia (pethidine → not Morphine w cause oedema of sphincter)
- 5- antibiotic (cefuroxime & metronidazole) to prevent infection
- 6- give O₂ (if hypoxic) & I.V Ca⁺⁺ gluconate (if tetany)
- 7- Monitor & stabilize pt [catheter, ECG, BP,etc]
- 8- ERCP (after pt stable) to remove any stone

(B) Surgical ttt :-

- Indicated if uncertainty of Dx, deteriorated pt.
- done by • exploratory laparotomy → peritoneal lavage, remove necrotic tissue & close over a drain
- Drainage of abscess if present

*Criteria for severity :-

Churchill/Bailey & Love's

Ranson criteria (score)		Glascow scale (in 48h)
• <u>on admission</u>	• age > 55 yrs • WBC > $16 \times 10^9/L$ • Glucose > 10 mmol/L • LDH > 700 IU/L • AST > 250 IU/L	• age > 55 yrs. • WBC > $16 \times 10^9/L$ • glucose > 10 (200 mg/dl) • LDH > 600 • AST/ALT > 600
• <u>within 48 hr</u>	• Urea ↑ > 16 mmol/L • Ca⁺⁺ < 2 mmol/L • PaO₂ < 8 kPa (< 60 mmHg) • base deficit < 4 • PCV ↓ > 10%	• Urea > 16 • Ca < 2 • PaO₂ < 8 • Albumin < 32 g/L

Bailey.

- The more criteria, the greater the mortality.
- Serum amylase & lipase do not correlate with severity of pancreatitis.

B

CHRONIC PANCREATITIS

* Definition :- ^{churchill}

- Is a continuing inflammatory disease characterized by irreversible functional & anatomical abnormalities of Pancreas resulting in fibrosis & pancreatic insufficiency, calcification.

* Aetiology :-

- chronic alcoholism (most common).
- others :- CBD, stone, traumatic duct structure, $\uparrow Ca^{++}$, hyperlipidemia.

* Clinical Picture :-

- 1- Pain :- epigastric, mild $\rightarrow$ severe, radiating to back, continuous or interrupted
- 2- Malabsorption (loss of enz.) $\rightarrow$ steatorrhea, wt loss, $\uparrow$ causing narcotic addict
- 3- Diabetes mellitus in 30% of cases. "churchill"

* Investigations :-

- [A] • Laboratory $\rightarrow$ serum amylase ($\uparrow$ during exacerbation), bd glucose (may $\uparrow$), lipid profile (hyperlipidemia), Ca^{++} (may $\uparrow$)
- [B] • Radiological $\rightarrow$ • abdominal USS & CT scan (most accurate) $\rightarrow$ duct dilatation & stone
• MRCP, ERCP

* Treatment :-

- [A] Conservative $\rightarrow$ stop alcohol, low fat diet, control pain, insulin (if DM)
• Pancreatic enzyme tablets with meal (Pancrex)
- [B] Surgical $\rightarrow$ (indicated if pain is ~~uncontrolled~~ uncontrolled)
• ERCP insertion of stent in the duct. "churchill"
• Longitudinal Pancreatico-jejunostomy "operation of choice"
• Partial pancreatectomy (proximal or distal)
• Total pancreatectomy (not done $\rightarrow$ high mortality)
 $\rightarrow$ isolate islet cell & do autotransplantation.

PANCREATIC CYST

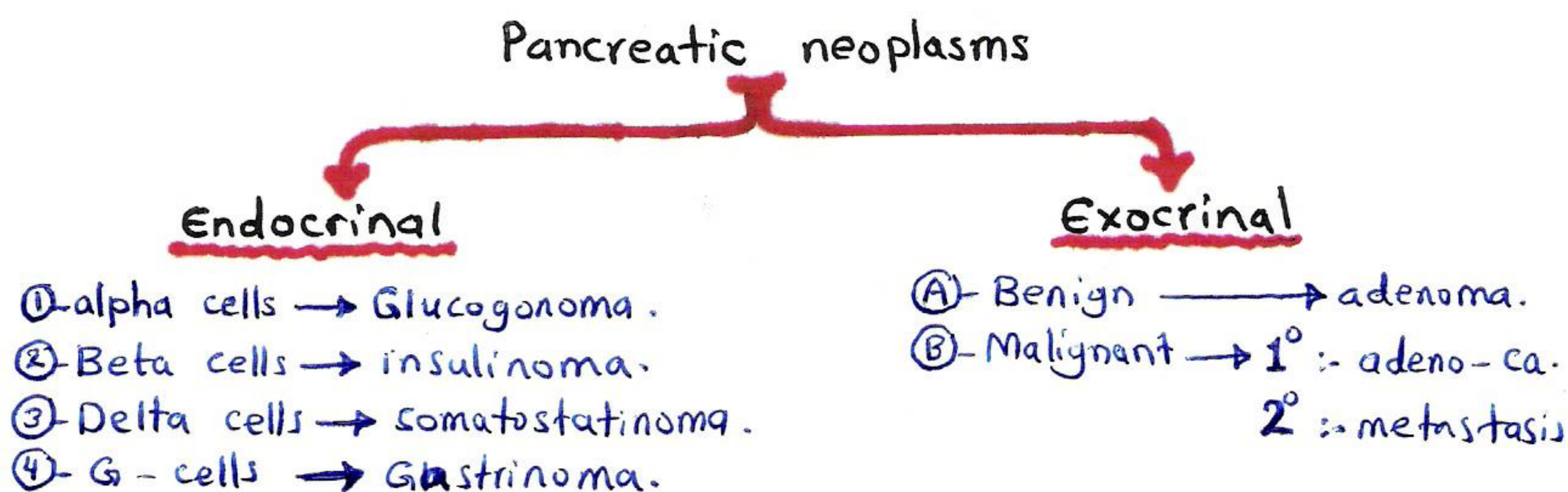
*[A]:- True cyst :- (20%):

- Can be - ① Acinar: as congenital cyst, retention cyst, cystadenoma
- ② Interacinar: as dermoid, hydatid cyst.

[B]:- Pseudo-cyst :- (80%):

- Definition:- Collection of fluid in lesser sac.
- Aetiology:- as a result of acute pancreatitis after 2-3 wk.
- Pathology:- pancreatic secretions & inflammatory exudate is collected within a lining of inflammatory tissue (not epithelium $\rightarrow$ Pseudocyst) in lesser sac.
- C/Picture:- H/o acute pancreatitis, trauma.
 - tender epigastric mass with transmitted pulsation
 - fever, wt loss, Nausea & Vomiting may occur.
- Complications:- infection, rupture, Hge, abscess (Never malignancy).
- Investigations:- Laboratory:- s. amylase (Persistently $\uparrow$), WBC $\uparrow$, bilirubin may $\uparrow$.
 - Radiology:- USS, CT scan $\rightarrow$ diagnostic
- Treatment:-
 - Small cyst usually disappear spontaneously ($<5\text{cm}$) (40%).
 - Surgery done after (6-12 wk) to allow the maturation of cyst & give time for spontaneous removal
 - Surgery by drainage of cyst through posterior wall of stomach "Cysto-gastrostomy"
 - but may $\rightarrow$ cystoduodenostomy or cystojejunostomy.
 - NB:- Excision is the most definitive ttt but is usually confined to chronic pseudocyst.

PANCREATIC NEOPLASM



* INSULINOMA :-

*** Definition :-** is a tumour of the β -cells of the islets of Langerhans.

*** Pathology :-** - the tumour is usually benign (few cases are malignant).
 - commonly in body & tail, rarely multicentric. ^{10%} churchill
 - Some are part of MEN type I.

*** Clinical Picture :-** - commonly in adult < 40 yr, overweight due to over eating (hypoglycemia), s/s of hypoglycemia marked by fasting, unconscious episodes (mis Dx as psychological)
 - Whipple's triad $\rightarrow$ attack of hypoglycemia on fasting.
 $\rightarrow$ hypoglycemia < 45 mg/dL on attack.
 $\rightarrow$ symptoms relieved by glucose.

*** Investigations :-** - blood glucose < 45 mg % during attack.
 - localize insulinoma (difficult) $\rightarrow$ CT, selective angiography.

*** Treatment :-** resecting tumour by distal pancreatectomy.

* GASTRINOMA :- "Zollinger - Ellison syndrome"

Bailey & Love's

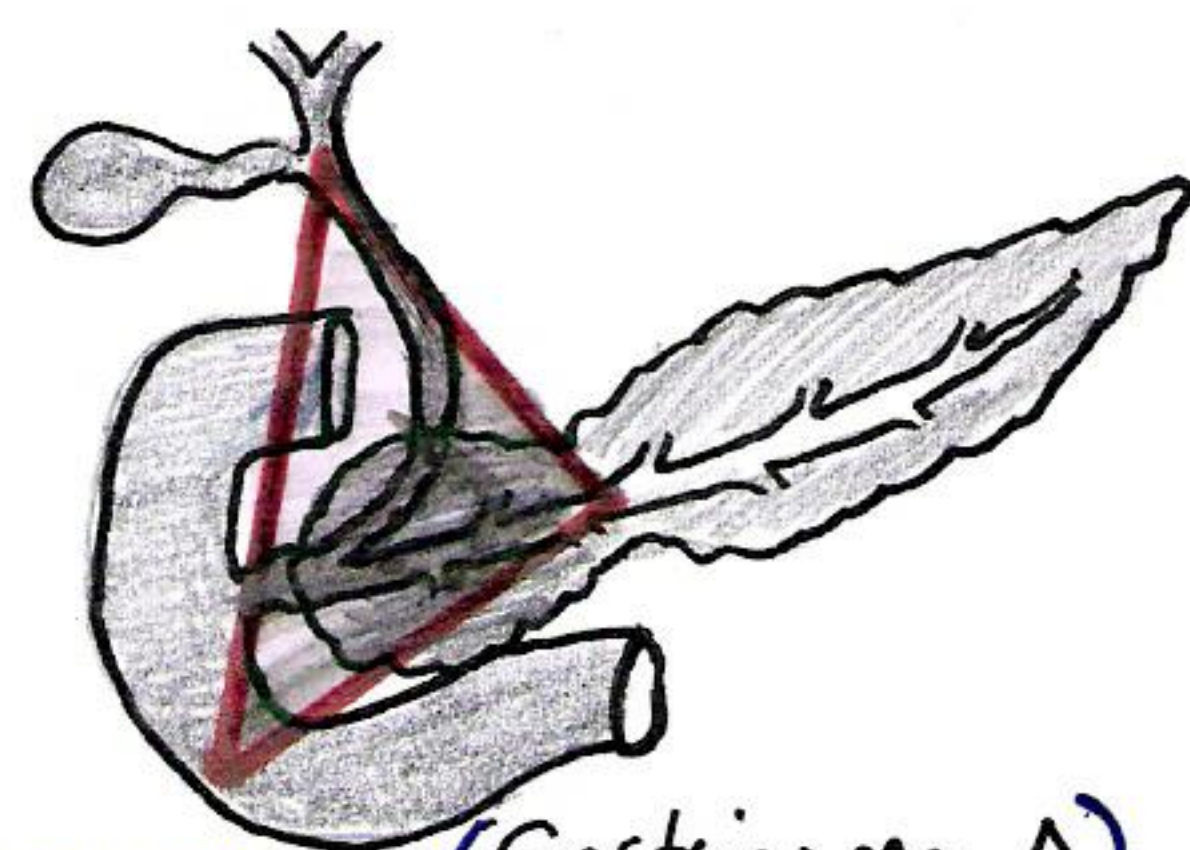
*** Definition :-** is a rare tumour arising from non-beta cells $\xrightarrow{\text{secrete}}$ gastrin.

*** Pathology :-** - about 60% are malignant, may part of MEN I
 - about 80-90% found in Gastrinoma triangle

- junction of cystic duct & CBD $\rightarrow$ superiorly
- junction of 2nd & 3rd part of duodenum $\rightarrow$ inferiorly
- junction of neck & body of pancreas $\rightarrow$ medially

*Clinical Picture:-

- Abdominal Pain caused by peptic ulceration ~~may~~ may bleed & Perforate
- the Dx of Gastrinoma is suspected by :-
 - 1- Ulcers resistant to treatment.
 - 2- recurrent ulcers, extremes of age.
 - 3- Multiple ulcers in unusual sites.
- Diarrhoea in a third of cases because of
 - hyperacidity (Gastrin $\rightarrow$ $\uparrow$ HCL) $\rightarrow$ $\oplus$ $\uparrow$ pancreatic enzymes. (Gastrinoma Δ)
 - Gastrin $\rightarrow$ $\oplus$ stimulate intestinal motility.



*Investigations:-

- Upper GIT endoscopy & $\pm$ barium meal $\rightarrow$ shows the ulcers.
- G.F.T (Gastrin Function test) $\rightarrow$ estimate serum gastrin [N = <150 ng/L]
in most cases of gastrinoma >500 ng/L.
- Localize the tumour $\rightarrow$ CT scan, selective angiography.

*Treatment:-

- Ideal ttt is excision of tumour (only 20% resectable $\rightarrow$ multiple, ^{localization} poor).
- Usual ttt : Total gastrectomy (abolish acid secretion).
- Less effective ttt is prolonged intensive ttt by omeprazole.

*CARCINOMA:-

*Incidence:-

- Cancer pancreas is increasing in frequency
- Affects age mainly 40-60 yrs ^{$\rightarrow$ churchill} slightly more in male ($\sigma = \sigma \rightarrow$ Baily)

*Aetiology:-

- Predisposing factors are smoking, chronic pancreatitis, high ptn & fat diet

*Pathology:-

Macro { Site :- 60% in head, 40% others
N/E :- hard mass, c/s areas of Hge & necrosis.

Micro $\rightarrow$ Microscopic :- 90% are duct cell adenocarcinoma
10% others (adenosquamous Ca, mucinous, giant cell,etc)
cystadeno-ca

- **Spread** :- Direct :- to CBD, stomach, transv colon, --- etc
- Lymph :- to regional LN → Porta hepatis → coeliac LN → Paraaortic LN → thoracic duct → Lt supraclavicular LN (Virchow's gland).
- Blood :- to Liver mainly, (may LBB).
- Transcoelomic :- (transperitoneal) → ascitis 10%.

* Clinical Picture :- "Baily & Loves"

- the most frequent symptoms are non-specific, namely epigastric discomfort, anorexia, & wt loss. anemia. [Pain radiate to back]
- the most Common sign is Painless progressive jaundice (85%).
- O/E :- jaundice, palpable liver, Palpable GB "Courvoisier's law"
 - migrating thrombophlebitis Trousseau's sign, LN → Virchow's gland.

* Investigations :-

- Laboratory → LFT, Jaundice investigation.
- Radiological → • USS. (1st to be ordered) → dilated CBD, GBS, Liver metastasis
- CT scan → shows the tumour, live metastasis.
- ERCP or PTC → Dx :- site of obst., GBS... etc
- ttt :- placing stent in CBD

* Treatment :- "Baily & love's" "churchill"

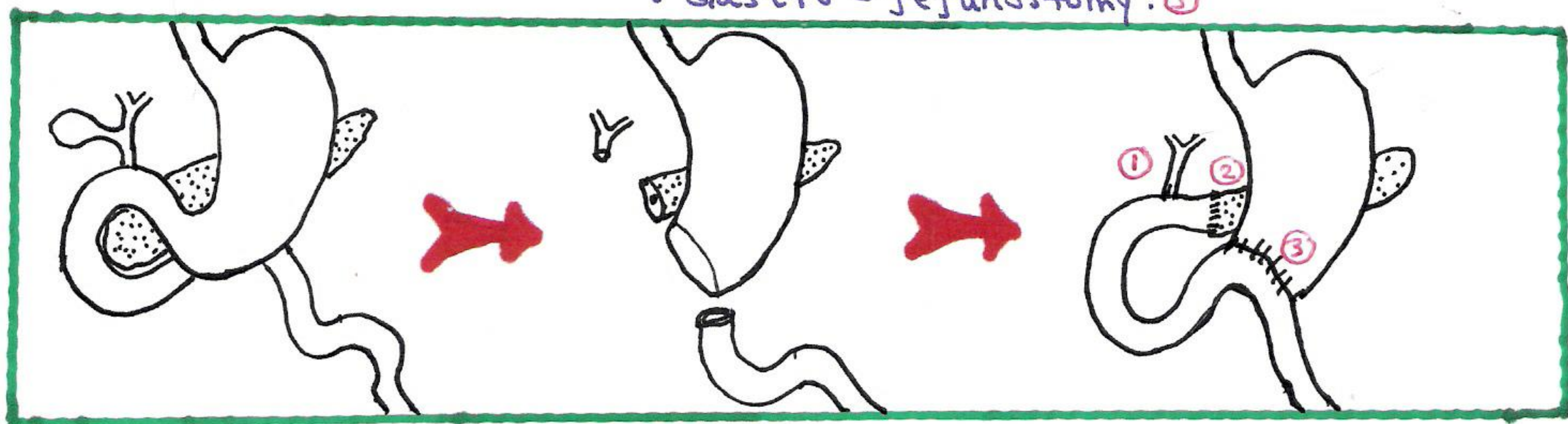
* OPERABLE :- (about 10%)

By Whipple's operation :- removal of duodenum, head & neck of pancreas, gall bladder & CBD

then restore by • choledochojejunostomy. ①

• Pancreaticojejunostomy. ②

• Gastrojejunostomy. ③



"Baily"

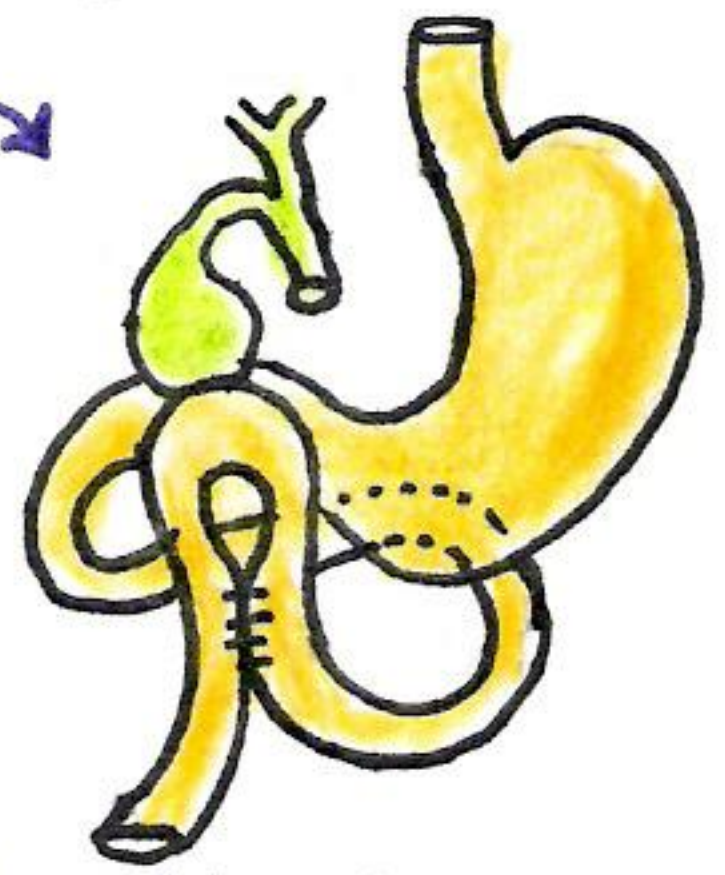
- mortality of whipple's operation $\approx$ 5% & 5 year survival after resection is poor. and 40% develop post-operative complications [Hge, septicemia, renal & hepatic failure.....etc]

* NON- OPERABLE :- (majority):

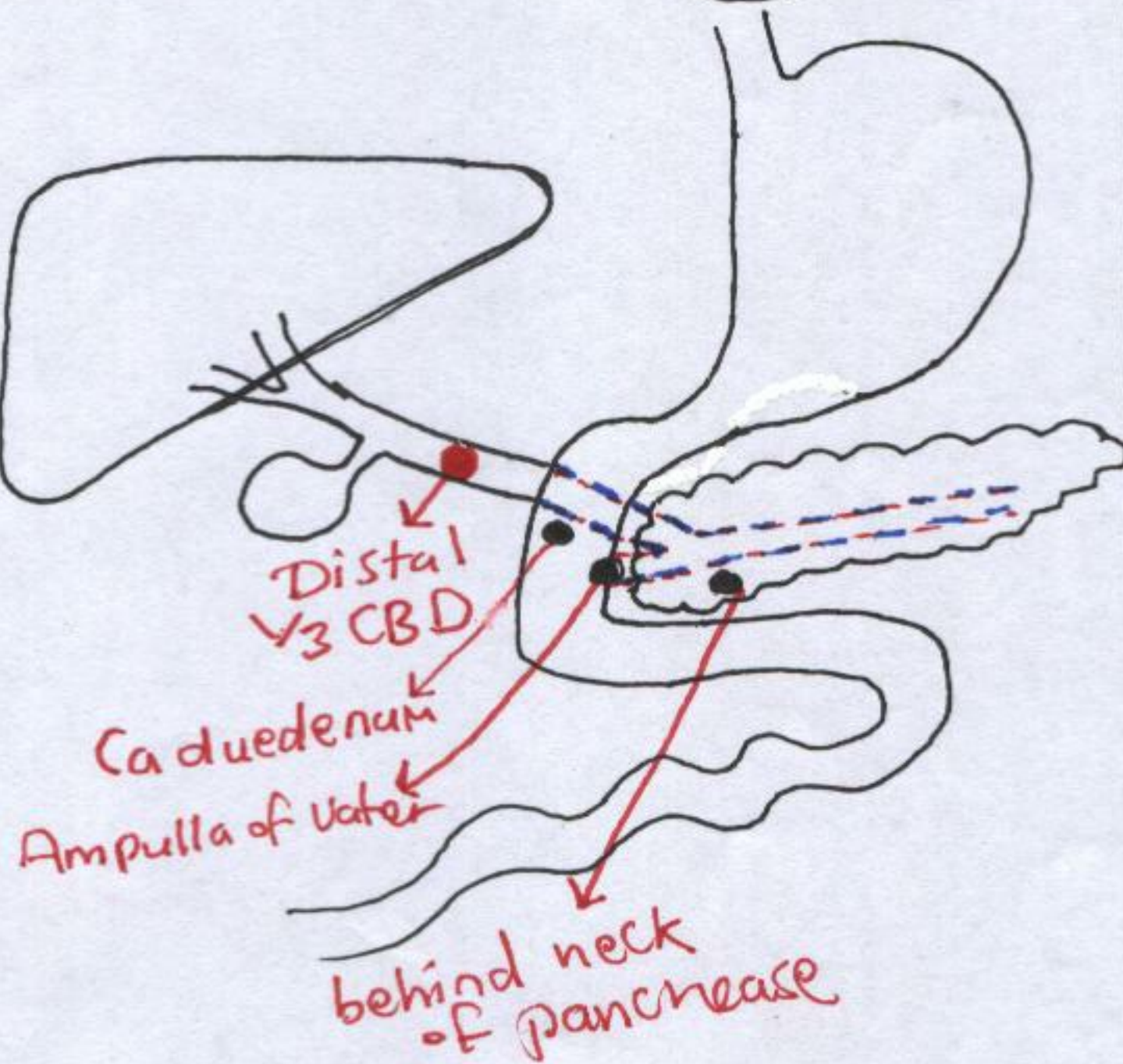
- Drainage of bile by [biliary stent using ERCP] or [cholecysto-jejunostomy with jejunostomy] →
- symptomatic ttt (ttt anemia, dehydration,etc)

* Prognosis :: "Baily & Love's"

- about 10% of cases are operable.
- operative mortality about 5%.
- about 40% of cases operated have post op. complications.



Whipple's Operation Rule of 4



* 4 indications :

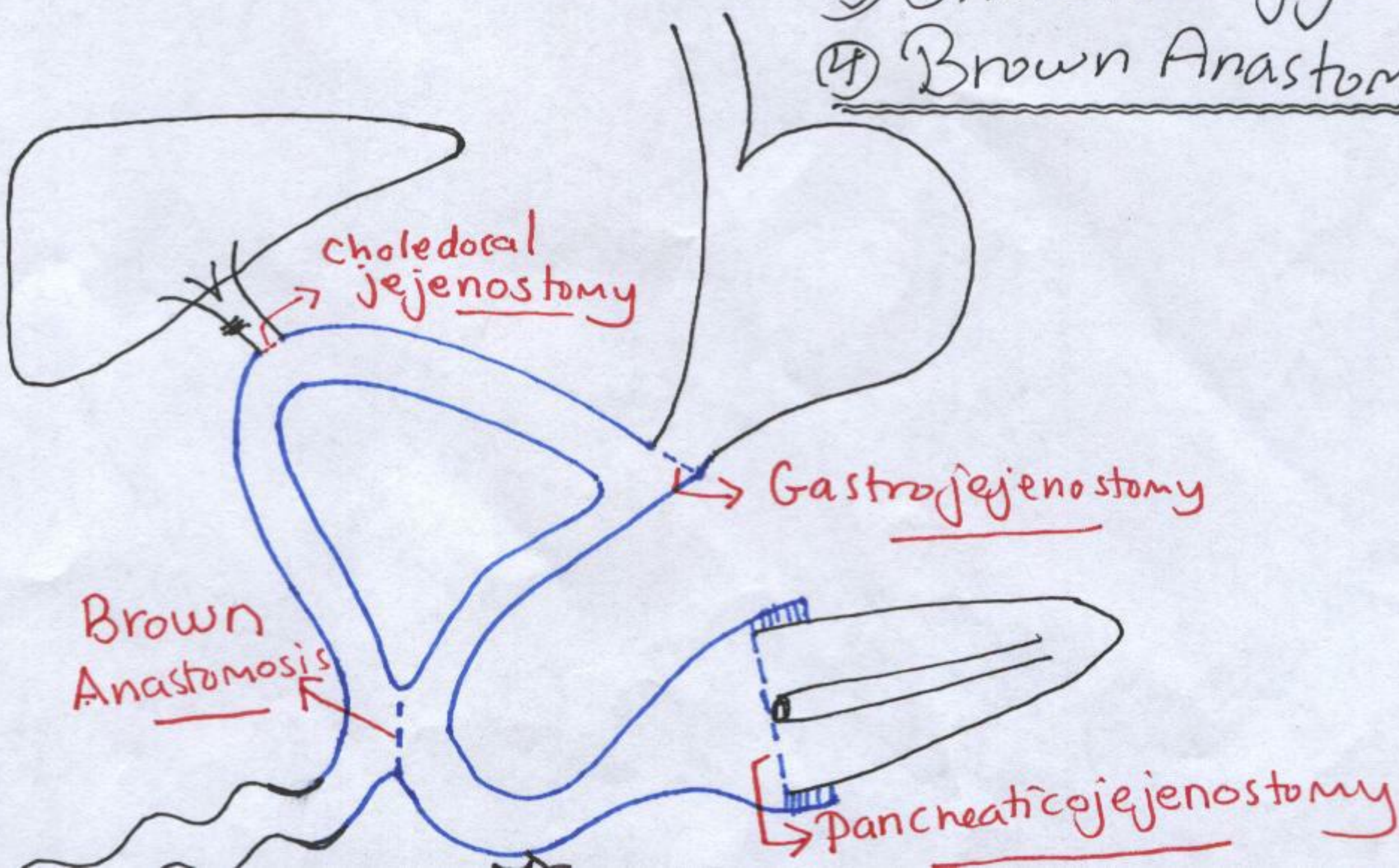
- ① Periampullary Ca
- ② Ca. distal part of CBD
- ③ Ca. head & neck of Pancreas
- ④ Ca duodenum.

* 4 resections :

- ① duodenectomy
- ② proximal pancreatectomy
- ③ Resection of distal C.B.D
- ④ Cholecystectomy

* 4 Anastomosis :

- ① pancreatco-jejunostomy
- ② Gastro-jejunostomy
- ③ Choledoco-jejunostomy
- ④ Brown Anastomosis.



Cullen's sign

